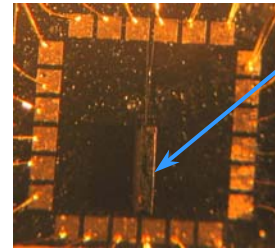
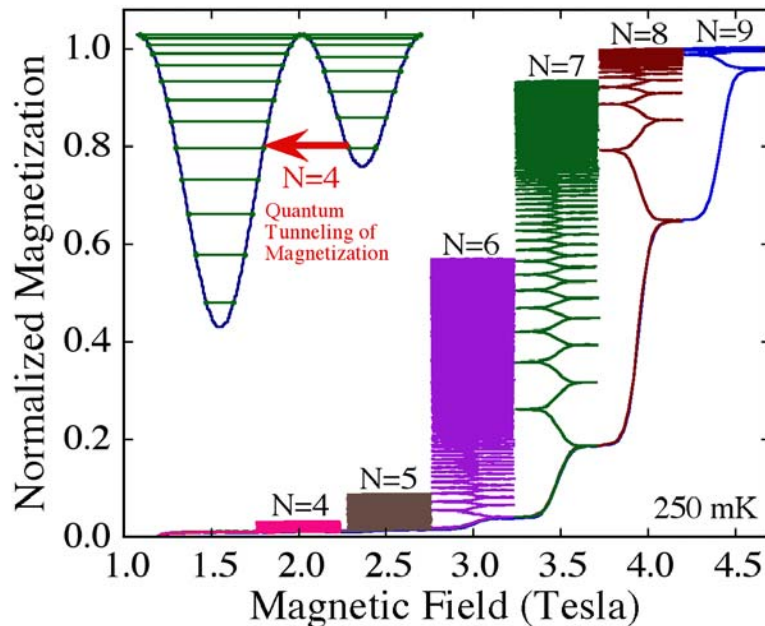


The Single Molecule Magnet, $\text{Mn}_{12}\text{-ac}$

Myriam Sarachik, City College of New York, DMR-0116808

Quantum Tunneling of Magnetization

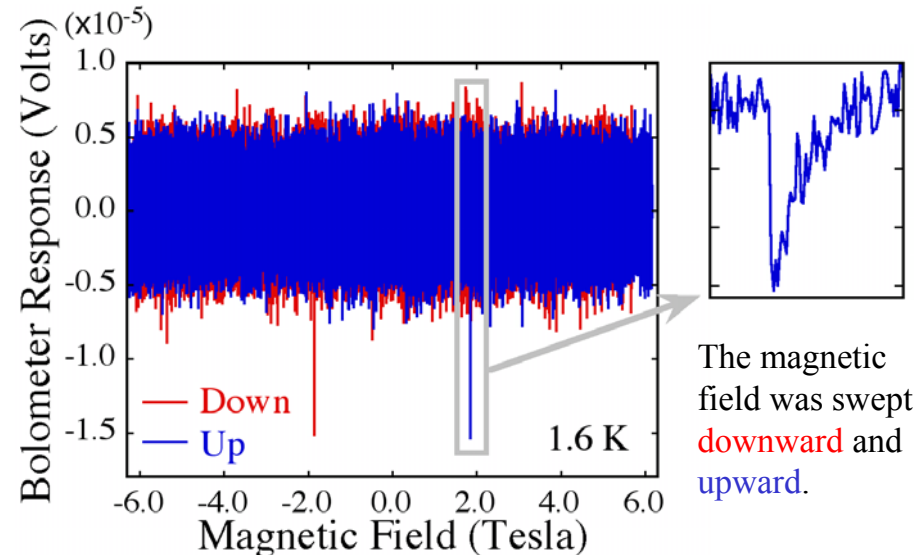
The single molecule magnet, $\text{Mn}_{12}\text{-ac}$, exhibits quantum tunneling of magnetization that are manifested as steps in magnetization curves when two energy levels coincide in the double-well potential. Evidence for a distribution of tunnel splitting was obtained using a new experimental protocol where magnetic field was swept back and forth across each resonance, N. (*Solid State Commun.*, **127**, 131139, 2003.)



A crystal of $\text{Mn}_{12}\text{-ac}$ was mounted on an array of $10 \times 10 \mu\text{m}^2$ Hall sensors which were also used to measure the local magnetization of the sample.

Superradiance

Electromagnetic radiation was detected during fast magnetic relaxation. Theory predicts that such avalanches may be accompanied by superradiance. This suggests that $\text{Mn}_{12}\text{-ac}$ could be used as a source of coherent microwave radiation.

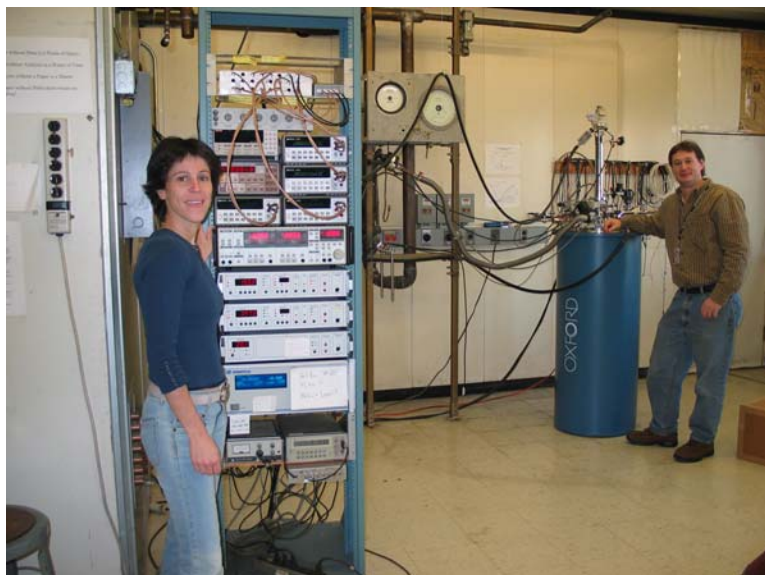


The Single Molecule Magnet, $\text{Mn}_{12}\text{-ac}$

Myriam Sarachik, City College of New York, DMR- 0116808

Education

Three graduate students (Kevin Mertes, Yoko Suzuki and Nurit Tayar) contributed to this work. Kevin Mertes (right in the picture below) received his Ph.D. in 2002 and is now a postdoc. Yoko Suzuki became a Ph.D. candidate this year. Nurit Tayar (left in the picture below) is a visiting student from Eli Zeldov's lab at the Weizmann Institute.



Outreach

Under the STARS program, four eighth grade students (Waciuma Maina and Letisia Quezada for 2001-2002, Johnnery De Jesus and Omar Faueras for 2002-2003) from the Mott Hall School in Harlem spent three hours a week working in the lab as prospective young scientists. The goal of STARS is to empower motivated minority students to pursue careers in Science and Engineering.

Waciuma and Letisia (from left) were transferring liquid helium into the cryostat with Yoko (right).



They subsequently won first place for the presentation on their experiment.